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said relief pattern formed on said green sheet has at least one recess having a tapered shape.

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30 (Amended) An ink jet printer head according to claim 18, wherein:

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said nozzle ports are formed by a lithographic method.

REMARKS

Claims 1-33 are pending. Claims 1, 10, 18, 19, 26 and 30 have been amended. Claims 5, 11-13, 15-17, 21, 27-29 and 31-33 have been withdrawn from further consideration as a result of the restriction requirement issued in this application. Applicants reserve to present these claims in a divisional application at the appropriate time. Reconsideration is respectfully requested in light of the amendments and remarks made herein.

Regarding the drawings, it is proposed to label each of Figs. 11 and 12 as "Prior Art," as indicated on the attached marked-up drawing sheet. As for the tapered recess of the relief pattern recited in claims 10 and 26, that feature is illustrated in Fig. 5.

The specification has also been amended to expressly indicate that the green sheet is preferably a master plate. Support for this amendment can be found at, for example, p. 3, lines 27-34, of the specification. No new matter has been added.

With respect to the rejection of claims 10 and 26 under 35 U.S.C. § 112, ¶2, the Examiner will note that the language "having an opening larger than a bottom" has been deleted. Such amendment is not meant to narrow the scope of any claim. Other non-narrowing amendments have also been made to these claims simply to improve their form.

Each of independent claims 1 and 18 has been amended to further emphasize that the relief pattern on the green sheet corresponds to the concave portion that defines the ink pressure chamber(s), and that the concave portion is made on the head base from which the green sheet has been stripped off. Each of dependent claims 19 and 30 have been amended to conform with the amendment made to claim 18.

Turning now to the art rejections, claims 18-20, 22, 23, 26 and 30 have been rejected under 35 U.S.C. § 102(b) based on Japanese patent document JP 5-286141 (JP '141). This patent document is directed to an orifice or nozzle plate. A base plate comprised of a non-conductive pattern formed on a conductive Ni substrate. After a releasable film is formed on the surface of the base plate containing the non-conductive pattern, an electroforming Ni film is precipitated on the releasable film and released from the base plate to produce the orifice plate. JP '141 does not disclose a head base formed as recited in independent claim 18, which is an apparatus claim (i.e., a claim directed to an ink jet printer head) containing a process-type limitation regarding the manner in which the head base element is formed. As such, this limitation must be considered in determining patentability.

Moreover, there is a significant difference between the final structure of the ink jet head shown in Fig. 1 of JP '141 and the structure of the head base that has been stripped off from a green sheet, according to independent claim 18. As recited in claim 18, the head base comprises a concave portion defining ink pressure chambers and a plate in which corresponding nozzle plates are formed, while the green sheet has a relief pattern corresponding to the concave portion. Fig. 1(f) of JP '141 only shows the nozzle plate. But, according to the present invention, the stripping off of the head base from the green sheet yields not only the nozzle plate but also the concave portion that corresponds to the ink pressure chamber. Accordingly, it is respectfully submitted that claims 18-20, 22, 23, 26 and 30 are patentably distinguishable over JP '141.

Claims 1, 2, 6, 7, 14, 18-20, 22, 23 and 30 stand rejected under 35 U.S.C. § 102(b) based on U.S. Patent 5,560,837 to Trueba, and claims 3 and 4 have been rejected under 35 U.S.C. § 103(a) based on Trueba which is directed to making a mandrel structure for forming thin film components. Fig. 2K of Trueba shows members 205, 205' and 211' formed on a work piece 217 and extending from a glass substrate 201. Work piece 217 is then peeled off to form a nozzle plate as shown in Fig. 2L. Thus, the final structure of Trueba is the nozzle plate. It has no concave portion defining an ink pressure chamber, as recited in independent claim 1. Also, Fig. 2 of Trueba does not illustrate a manufacturing method in which the stripping off of a head base from a green sheet yields a nozzle plate

and the concave portion that defines the ink pressure chamber. Accordingly, it is respectfully submitted that claims 1, 2, 6, 7, 14, 18-20, 22, 23 and 30 are patentably distinguishable over Trueba.

Claims 8, 9, 24 and 25 have been rejected under 35 U.S.C. § 103(a) based on Trueba in view of U.S. Patent 5,640,184 to Moynihan et al. (Moynihan), and claims 10 and 26 have been rejected under § 103(a) based on Trueba in view of U.S. Patent 5,470,693 to Sachdev et al. (Sachdev). However, neither of these secondary references offset the shortcomings of the primary reference, Trueba, and since each of these claims is dependent on either claim 1 or 18, it is submitted that these claims are also allowable.

CONCLUSION

In view of the foregoing amendments and remarks, applicants respectfully request favorable reconsideration of the present application.

Respectfully submitted,

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Date: November 8, 2001

Version with Markings to Show Changes Made to Specification

Page 15, lines 21-25:

According to the method of manufacturing a head base as described above, the green sheet 10, once manufactured, can reused repeatedly as long as durability permits. The manufacturing steps ~~of~~ for the second and subsequent ~~semiconductors~~ head bases can therefore be omitted, thus permitting reduction of the number of processes and cost reduction.

Version with Markings to Show Changes Made to Claims

1. (Twice Amended) A method of manufacturing an ink jet printer head having a head base, comprising the steps of:

manufacturing a green sheet having a prescribed relief pattern in response to said head base; ~~forming said head base by coating and solidifying a material for forming said head base on a surface of said green sheet having said relief pattern, said head base comprising a plate in which a nozzle port is formed and a concave portion defining an ink pressure chamber, said green sheet having a relief pattern in response to the concave portion defining said ink pressure chamber;~~ stripping off said head base from said green sheet; and forming ~~a~~ the nozzle port for discharging the ink on said head base.

10. (Twice Amended) A method of manufacturing an ink jet printer head according to claim 1, wherein:

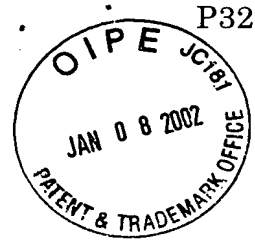
~~a recess of~~ said relief pattern formed on said green sheet has at least one recess having a tapered shape having an opening larger than a bottom.

18. (Twice Amended) An ink jet printer head, comprising: ~~having~~

a head base having a concave portion defining a plurality of ink pressure chambers, and a plate in which corresponding nozzle ports are formed;

wherein said head base ~~manufactured by a method comprising the steps of:~~

~~manufacturing a green sheet having a prescribed relief pattern in response to said head base;~~



~~forming said head base is formed~~ by coating and solidifying a material for forming said head base on a surface of said ~~a~~ green sheet having said ~~a~~ prescribed relief pattern corresponding to the concave portion defining the plurality of pressure chambers; stripping off said head base from said green sheet; ~~and forming a~~ the nozzle ports for discharging the ink on said head base.

19. (Amended) An ink jet printer head according to claim 18, wherein:

~~said green sheet manufacturing step comprises a step of~~ head base is formed by forming a resist layer in response to a prescribed pattern on a substrate of said green sheet, and then manufacturing said green sheet by forming said relief pattern on said substrate of said green sheet by etching.

26. (Amended) An ink jet printer head according to claim 18, wherein:

~~a recess of~~ said relief pattern formed on said green sheet has at least one recess having a tapered shape ~~having an opening larger than a bottom.~~

30. (Amended) An ink jet printer head according to claim 18, wherein:

~~said nozzle port forming step comprises forming said ink discharging~~ nozzle port ports are formed by a lithographic method.